

## TOP FOR A CONVERTIBLE VEHICLE

The invention relates to a top for a convertible vehicle according to the type further specified in the preamble of Claim 1.

In principle, when a flexible roof panel of a convertible top is attached, there is the possibility of attachment it to a separate clip, which is moved with the motion of the convertible top separately from it, or flexible roof panel can be attached to the body.

An example of attachment a flexible roof panel to a roof holding clamp connected to a convertible- top mechanism is known, for example, from DE 39 03 680 C1.

A top for a convertible vehicle with a flexible roof panel, which is attached directly to the body is known from EP 0 502 320 A2. For this, a convertible top attachment is provided with an attachment structure on the body at least in the rear part of the vehicle, in which the convertible top material is accommodated in the region of its edge with a clamping element. An auto-body clamping strip, having the attachment structure, and a clamping profile connected water-tight to the convertible top material with integrated clamping element are then clamped to each other in an auto-body shaft covered by body parts in the connection position. A cord insert, extending over the entire width of the rear part of the vehicle in the area of the trunk lid is proposed as an integrated clamping element in the clamping profile.

The clamping profile is clamped with an auto-body clamping strip held to body parts that are mounted on one edge of a water-channel sheet forming an auto-body shaft and lie beneath the trunk lid in the closed state of the convertible top, which lies against the flexible roof panel of the convertible top in the closed state of the convertible top with an auto-body closure seal that reduces friction.

In this known arrangement, there is little latitude in the configuration for arrangement of the clamping profile with the integrated clamping element, since a larger spacing between the auto-body closure seal of the trunk lid and the clamping profile provided to join the flexible roof panel to the auto body adversely affects the sealing effect in the region of the auto-body closure seal. Consequently, an arrangement of the clamping profile contained in the clamping element for the flexible roof panel in a vehicle height position close to the auto-body closure seal is advantageous. Such a comparatively high arrangement of the joining of the flexible roof panel to the auto body, however, means that the storage position of the convertible top must also be chosen relatively high with respect to the height of the vehicle, so that the latitude for configuration of the auto body and convertible top is significantly restricted.

A convertible top attachment is also known from DE 1 192 529, in which the convertible top material is held in an attachment structure designed as an attachment groove by a clamping element mounted from the outside, with which the convertible top material is pulled into the attachment groove in the form of a loop. A tension wire, which is positioned directly on the loop of the convertible top material and causes a notch effect that adversely affects the convertible top material on the edge when the necessary tightening forces are applied, then serves as a clamping element. The arrangement of the attachment of the convertible top material and the clamping element also does not permit a low arrangement of a convertible top storage space with respect to the height of the vehicle.

The task of the present invention is to devise a top for a convertible vehicle with a flexible roof panel of the type mentioned, in which storage of the convertible top at a low vehicle-height level is possible, while guaranteeing the necessary clamping effect and sealing effect in the closed state of the convertible top.

This task is solved according to the invention with a top for a convertible vehicle according to the characteristics of Claim 1.

The embodiment of a convertible top according to the invention with a clamping device acting on the flexible roof panel, which is designed with at least one clip that forces the flexible roof panel in the closed state of the convertible top against an auto-body closure seal, has the advantage that the joining of the flexible roof panel to the auto body can be chosen far below the rear body-opening line and an auto-body closure seal adjacent to it, at least in areas, without the closed state of the convertible top being affected on this account. Since the convertible top can be stored lower with respect to the vehicle height, the deeper the joining of the flexible roof panel to the auto body is when a convertible top with a clamping device is configured according to the invention, a much deeper connection point of the flexible roof panel to the auto body with a corresponding material length between the rear window, preferably made in the flexible roof panel, and the body connection relative to the edge solution can be chosen.

The auto-body closure seal, according to the present invention, is to be understood in its broadest sense and can represent any type of seal that is supposed to prevent entry of water into a body shaft. The auto-body closure seal is advantageously arranged adjacent to the body-opening line.

The clamping device can be designed both with a single clip that essentially spans the vehicle width and with several, preferably two, symmetrically arranged clips, which, in terms of its operation, represent both separately driven units and units that can be moved with the convertible-top rods in connection with the convertible top motion.

Additional advantages and advantageous embodiments of the object according to the invention can be found in the description, the drawing, and the claims.

In the drawing:

Fig. 1 shows a perspective partial view of a rear area of a convertible vehicle with a convertible top in the closed state;

Fig. 2 shows a schematic, simplified cross-section through a clamping device of a convertible top according to the invention of Fig. 1, along line II-II in Fig. 1;

Fig. 3 shows a schematic, simplified cross-section through the convertible top of Fig. 1 and its clamping device along a line III-III in Fig. 1;

Fig. 4 shows a schematic cross-section corresponding to Fig. 2 through the clamping device according to the invention in the stored state of the convertible top;

Fig. 5 shows a simplified perspective view of the clamping device according to the invention in the closed state of the convertible top according to Figs. 1 through 3.

Fig. 6 shows a view of the clamping device according to Fig. 5 in a partially opened state of the convertible top;

Fig. 7 shows a perspective view of the clamping device corresponding to Fig. 5 and Fig. 6 in the stored state of the convertible top; and

Fig. 8 shows a partial perspective view of the top of the convertible vehicle of Fig. 1 with an alternative embodiment of the clamping device.

A rear area of a convertible vehicle 1 is shown in Fig. 1, in which a convertible top 2 can be moved between a closed position lying against a roof peak of vehicle 1 and a stored position in a storage space 3 in the rear.

The convertible top 2 is designed as a so-called soft top or fabric convertible top with a flexible roof panel 4, which is attached to a convertible-top rod 5, supporting it and causing movement of the convertible top 2, and connected with its edge region to the vehicle body 7 beneath a rear window 6.

For this purpose, the vehicle body 7 has an attachment device 9 beneath a body opening 9 with an auto-body closure seal 8, further shown in Fig 2 through Fig. 4, which is designed in the depicted variant with a clamping strip 10 that holds the flexible roof panel 4 and connection contours 11 for joining to a clip 22 or to other body elements in the region of a body shaft 12, for example, a water-channel profile or a convertible top sheet.

For tightening of the flexible roof panel 4 in the closed state of convertible top 2, a clamping device 13 is provided, which, in the variant according to Fig. 1 through Fig. 7, is designed with two clips 14, 15 assigned to each side of the vehicle.

The side clips 14, 15 can be moved between a first position, shown schematically in Fig. 4, through Fig. 7 with the convertible top 2 stored, and a position shown in Figs. 1, 2, 3, and 5 in the closed state of the convertible top 2, in which the clips 14, 15 in the closed state of convertible top 2 force the roof panel 4 against the auto-body closure seal 8 arranged in the region of the body-opening line.

The body-opening line in the variant shown is formed by an upper edge of the side outer surface 16, above a wheel opening 17 and an upper edge of a rear cover 18, but in a departure from this, it can also be provided that, for example, instead of the rear cover 18, a rear body element designed in several parts also forms the body-opening line.

As can also be seen from the theoretical clamping device 13 of the flexible roof panel 4 drawn in Fig. 2 and Fig. 3, the clamping direction of the flexible roof panel 4 is changed by the clamping device 13, so that in the closed state of the convertible top 2, it lies sealed against the body-closure seal 8.

In the advantageous embodiment shown according to Fig. 1 through Fig. 7, the side clips 14, 15 can be pivoted on their rear ends about pivot point 20 and 21, which are attached to the body, which is arranged, in this case, on the attachment device 9 of the vehicle body 7 for the flexible roof panel 4.

The attachment device 9 in the depicted variants consists essentially of an at least roughly U-shaped clip 22 extending over the vehicle width, on which the clamping profile 10 is mounted, at least in areas, to hold the flexible roof panel 4.

Depending on the application, an expert art will also be able to select an attachment of the flexible roof panel to clip 22 with a clamping profile deviating from the variant shown or another element attached to the auto body by means of screwing, riveting, etc., if this is more appropriate for the specific application.

In the variants shown, the clip 22 of the attachment device 9 is joined with its corresponding ends to a convertible-top main support 23 arranged in the side area of the vehicle, on which a drive device (not further shown) engages and drives the convertible-top rod 5. With respect to its dimensioning, the clip 22, in the present case, is larger than clips 14, 15 arranged on the inside of the vehicle.

The side clips 14, 15 are articulated at their ends on the vehicle front by means of a toggle lever 24 and the convertible-top rod 5 to the main convertible-top support 23, in which the articulation is arranged at a higher point, with respect to the vehicle height, than the articulation of clip 22 of the attachment device 9.

The clamping device 13 connected to the convertible-top rod 5 and thereby to the main convertible-top support 23, in the variant according to Fig. 1 through Fig. 7, is movable by means of the drive device (not further shown) that drives the convertible-top rod 5, which, is, for example, a hydraulic cylinder, and can therefore be moved with the motion of the convertible-top rod 5.

An alternative variant of a clamping device 13' for the flexible roof panel 4 of the convertible top 2, corresponding in design to the depiction of Fig. 1 to Fig. 7, is shown in Fig. 8.

In contrast to the variant according to Fig. 1 through Fig. 7, with two side clips 14, 15, the clamping device 13' depicted in Fig. 8 is designed with a single clip 25, which is designed essentially U-shaped, like the clip 22 of the attachment device 9, and is joined with its ends to the corresponding side main convertible-top support 23. In the rear area, in the region of the transition between the side arms to the cross-arm of the U-shaped clip 25, this is connected on both sides by means of a toggle lever 26 and 27 to the clip 22 of the attachment device 9 and is thereby attached to the body.

Clip 25, similar to the side clips 14, 15 provided in the variant according to Fig. 1 through Fig. 7, can be moved from a position with the stored convertible top 2, in which clip 25 is essentially situated at the vehicle height of clip 22 of the attachment device 9, into a position that forces the flexible roof panel 4 against the auto-body closure seal 8. In contrast to the variant according to Fig. 1 through Fig. 7, a separate drive for clip 25 is provided here, which can be controlled as a function of the motion of the convertible-top rod 5.

In other variants, it can naturally be provided that a clamping device that corresponds essentially to the clamping device 13 depicted in Fig. 1 through Fig. 7, is equipped with a separate drive, or that a single clip be connected as in Fig. 8 to the convertible-top rod 5 without its own drive.

## LIST OF REFERENCE NUMBERS

1	Convertible vehicle
2	Convertible top
3	Storage space
4	Flexible roof panel
5	Convertible-top rod
6	Rear window
7	Vehicle body
8	Auto-body closure seal
9	Attachment device
10	Clamping profile
11	Connection contours
12	Body shaft
13	Clamping device
13'	Clamping device
14	Side clip
15	Side clip
16	Outer surface
17	Wheel opening
18	Rear cover
19	Theoretical clamping direction
20	Pivot point
21	Pivot point
22	Clip of the attachment device
23	Main convertible-top support
24	Toggle lever
25	Clip
26	Toggle lever
27	Toggle lever